California Regional Water Quality Control Board, Los Angeles Region

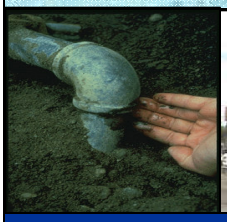
Roadmap to Closure for Leaking Underground Storage Tank Sites

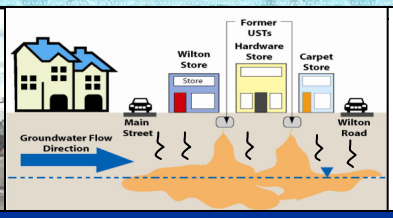
August 2007

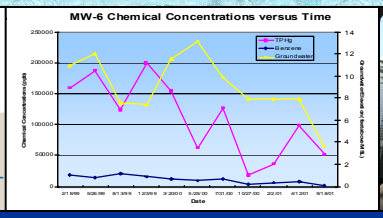
This fact sheet describes 10 important steps that you must take to expedite the closure of your leaking underground storage tank (LUST) site. These are the most important, and often overlooked steps in the site cleanup and closure process; however, these are not the only things that you need to do to clean up your LUST site. Check the Los Angeles Regional Water Quality Control Board (RWQCB) website, for all relevant guidelines and requirements for obtaining site closure.
http://www.waterboards.ca.gov/losangeles/html/programs/ust/underground.html

Site Cleanup and Closure Process

Release Report → **System Repair/ Upgrade/Removal** → **Site Assessment** → **Cleanup** → **Post-Cleanup Monitoring** → **Closure/Reuse**







1. **Define the extent of soil contamination**
2. **Locate wells properly and in adequate numbers to define the extent of groundwater contamination**
3. **Construct monitoring wells properly**
4. **Submit analytical and site data electronically**
5. **Develop conceptual site model, identifying source area, receptors, and exposure pathways**
6. **Provide performance data that demonstrate successful cleanup**
7. **Conduct post-cleanup confirmation sampling**
8. **Monitor and report groundwater data for an adequate period of time after cleanup**
9. **Provide current land owner information**
10. **Request closure and provide supporting documentation**

1. Define the Lateral and Vertical Extent of Soil Contamination

You must adequately determine the lateral and vertical extent of soil contaminated by fuels and chemicals at your site. You must obtain soil and groundwater samples at your site and submit them for laboratory analysis to determine:

- √ Where is the source of contamination?
- √ How far has the contamination spread laterally?
- √ How deep does the contamination extend vertically?
- √ What is the volume or mass of contamination?
- √ What are the petroleum and chemical concentrations in soil?

You must submit this information to the RWQCB in a site assessment report that documents the sampling effort and evaluates the results. This report must list all sample results in tables, graphs, and figures, with the sample dates clearly shown. See example site assessment report format at right. **All reports must be signed by a professional geologist or a professional civil engineer**.

Example Site Assessment Report

1. Introduction
2. Site Background/History
3. Site Work Performed
4. Data Evaluation and Interpretation QA/QC
5. Site Conceptual Model, including Sources, Pathways, and Receptors
6. Conclusions
7. Recommendations and Future Work

Figures

1. Site Map: UST System, Sample Locations
2. Concentration Contour Map
3. Groundwater Contour Map
4. Boring Logs with Concentrations
5. Geologic Cross Sections w/ Chem. Data
6. Concentration vs. Time and Distance Graphs for key wells

Tables

1. Water Depth and Elevations
2. Soil, Soil Gas and Water Concentrations
3. Well Construction Details

Note: All reports must be signed by a licensed geologist or civil engineer. Incomplete or insufficient reports may be referred to the State Licensing Board.

2. Locate Wells Properly to Define the Extent of Groundwater Contamination

You must define the vertical and lateral extent of groundwater contamination by installing and sampling appropriately-located ground water monitoring wells in adequate numbers. A minimum of 3 wells are required to determine groundwater flow gradient and direction. Wells must be located:

- √ Upgradient of the source area(s), logged from continuous cores to define site hydrogeology (gradient should be determined from surrounding sites or regional data).
- √ In the source area of contamination (DO NOT cross-contaminate or drag contamination to underlying zones).
- √ Downgradient of the source area(s) to monitor zones where contaminants are migrating. Wells may be required at multiple depths. Offsite wells are required if contamination leaves the site. Consult the RWQCB for location and depth requirements.

3. Construct Monitoring Wells Properly

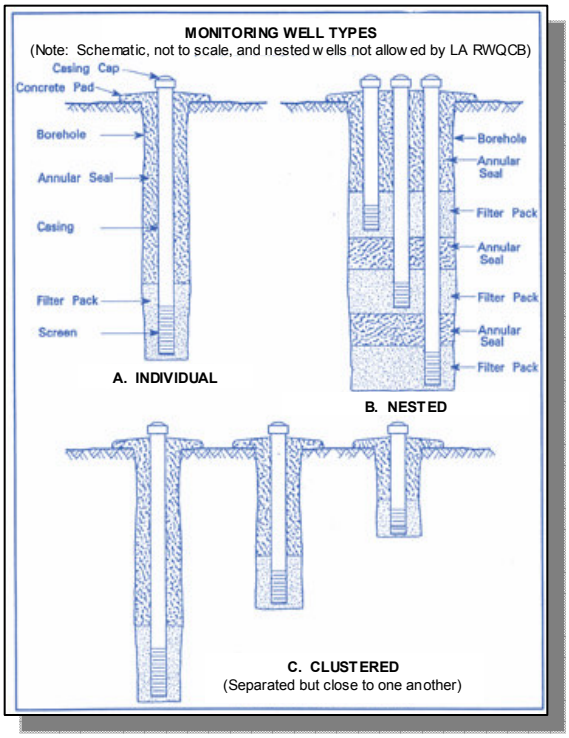
All groundwater monitoring wells must be built to measure groundwater elevation and to collect groundwater samples for chemical analysis. Wells must be constructed to minimize vertical flow, prevent cross-contamination, and reduce dilution of groundwater samples as follows:

- √ Work with a registered professional, obtain well permits, and use clean drilling equipment.
- √ Continuously log at least one borehole. Record soil types, groundwater elevation, and concentration by depth. Use this information for well and screen design.
- √ Conditions vary from one location to the next and screen lengths must be designed appropriately for site hydrogeology and lithology.
- √ Place the top of screen for first zone wells above highest water table level, taking into account historical and projected variations in water levels. **DO NOT screen across intervening fine-grained confining layers. Subsequent zones must be screened separately using clustered wells (see figure above).**
- √ Use clean equipment for well construction, seal the annular space above the screen, provide an adequate surface seal, and protect well with a vault or stovepipe, and water tight cap with lock.
- √ Document as-built well construction details and have a professional survey location and elevation of all wells.

Well construction must comply with:

(1) Department of Water Resources Bulletins 74-81 and 74-90 http://www.dpla.water.ca.gov/sd/groundwater/california_well_standards/well_standards_content.html

(2) **Chapter 15 Regulations, Section 2649** http://www.swrcb.ca.gov/cwphome/land/docs/chapter15regs.pdf



4. Submit Analytical and Site Data Electronically

You are required to submit soil, soil gas, and groundwater data electronically to California State GeoTracker database.

- √ Report all analytical data collected after September 1, 2001 in the correct electronic deliverable format.
- √ Provide data specific to the location of samples and wells obtained after January 1, 2002, including:
  - Latitude, longitude, and elevation survey data for all groundwater monitoring wells,
  - Groundwater information (e.g., elevation, depth to free product, monitoring well status, etc.),
  - A site map showing sample locations, and
  - Electronic copies of reports submitted to RWQCB.
- √ Provide cleanup and monitoring reports, as described in RWQCB guidelines http:/www.waterboards.ca.gov/ust/cleanup/electronic_reporting/index.html

The RWQCB cannot issue site closure until required information has been uploaded to GeoTracker database. Additionally, reimbursement from the California State Cleanup Fund may be delayed or denied if required uploads have not been completed.

GeoTracker

Websites for more Info:

(1) http://www.waterboards.ca.gov/losangeles/html/programs/ust/e-QMRGuideline.pdf

(2) http://www.waterboards.ca.gov/losangeles/html/programs/ust/LACountyGuidelines93.pdf

(3) http://geotracker.waterboards.ca.gov/

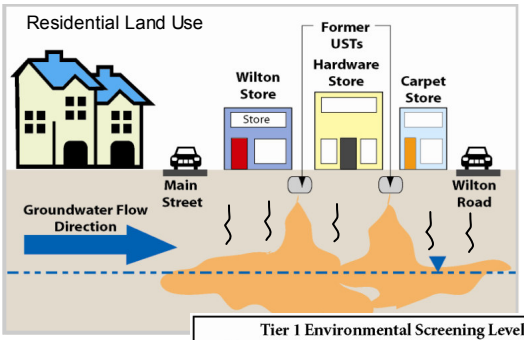
California Regional Water Quality Control Board—Los Angeles Region, 320 W. 4th Street, Suite 200, Los Angeles, California 90013
Phone (213) 576-6600 Fax (213) 576-6640 — Internet Address: http://www.waterboards.ca.gov/losangeles

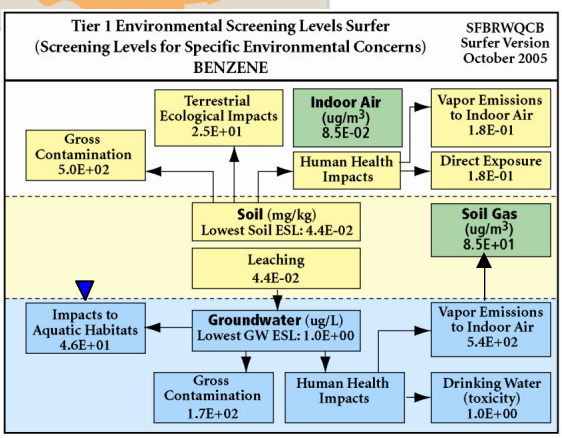
5. Develop Conceptual Site Model—Identify Source Area, Receptors, and Exposure Pathways

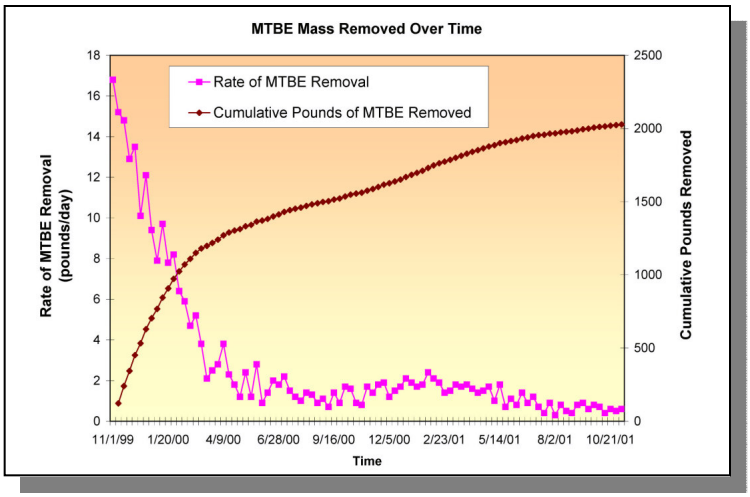
The conceptual site model must address location and transport of contaminants potential impacts to human health, the environment, or beneficial uses of water resources:

- √ Identify sources of contamination (e.g., USTs, piping, and dispensers) and whether they have been removed.
- √ Assess the nature and extent of contamination through soil, soil vapor, and/or groundwater sampling. Prepare data tables, maps, and graphs showing current conditions and changes over time.
- √ Identify lithology, groundwater depth, flow direction, and dominant contaminant fate and transport mechanisms.
- √ Discuss free product, dissolved contaminant plume length, plume status over time (e.g., expanding, stable, or shrinking), and biodegradation potential.
- √ Identify the distance to the closest production well.
- √ Identify current site land use, nearby land uses, and potential receptors.
- √ Specify potential exposure pathways, especially the distance and depth of nearby water supply wells, vapor intrusion potential to nearby structures, and potential for direct contact with soil.
- √ Compare chemical concentrations to California maximum contaminant levels (MCLs) and screening levels http://www.dhs.ca.gov/ps/ddwem/chemicals/mcl/regextract.pdf
- √ Assess potential vapor intrusion using multi-depth soil gas (BTEX, MTBE, oxygen, methane) and soil matrix data (BTEX, MTBE, TPH). Compare to Table 4-1, UST Closure Criteria. http://www.waterboards.ca.gov/losangeles/html/programs/ust/closure_criteria/ClosureCriteria.pdf
- √ Consult with RWQCB regarding need for cleanup.

Example Conceptual Site Model Formats:







6. Provide Performance Data that Demonstrate Successful Cleanup

If your site requires cleanup and you have performed remediation, you must provide information to the RWQCB that demonstrates cleanup is complete.

For active site remediation, include:

- √ Contaminant concentrations over time, and
- √ Contaminant mass/volume removed over time.

These data trends must be used to assess the progress of the cleanup and estimate whether continued cleanup will decrease concentrations to the point where the cleanup system can be turned off.

For *in-situ* or passive technologies such as enhanced biodegradation or monitored natural attenuation (MNA), include:

- √ Site specific geochemical and water quality parameters, and
- √ Analytical results and groundwater elevations.

A detailed monitoring and sampling plan must be submitted for RWQCB approval prior to implementation of remediation to ensure that all required monitoring is conducted. Testing should conform to Water Board General Laboratory Testing Requirements (9/06) http://www.waterboards.ca.gov/losangeles/docs/LABREQ9-06.pdf

7. Conduct Post-Cleanup Confirmation Sampling

Confirmation sampling is required following cleanup activities to determine if residual contaminant concentrations remaining at the site are below acceptable levels. Confirmation sampling can include soil matrix sampling, rebound testing of a soil vapor extraction (SVE) system, groundwater sampling, and/or soil gas sampling. The type of confirmation samples depends on the case-specific situation.

Submit a confirmation sampling workplan to the RWQCB for approval prior to collecting the confirmation samples to ensure that the sampling is adequate and representative of the area(s) that required cleanup. Consult with RWQCB staff for potential sampling options.

8. Monitor and Report Groundwater Data for an Adequate Period of Time After Cleanup

Chemical concentrations in groundwater must be monitored over time to evaluate plume migration or movement. **In general, a minimum of four consecutive quarters of groundwater monitoring data collected seasonally over a year are required prior to case closure**. If you believe it is warranted to reduce monitoring frequency or the number of wells, provide justifications and contact RWQCB staff to get approval before implementing a modified sampling plan. Any requests submitted for reduction in the frequency of monitoring will be evaluated on a case-by-case basis.

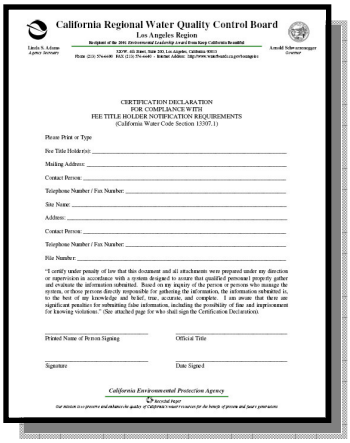
Equally important to the number of sampling events is the quality of sampling conducted during each event. Standard protocols for chain of custody, quality assurance and quality control must be strictly observed.

All groundwater data obtained since the beginning of monitoring must be tabulated and included in each monitoring report. Sampling **events missing data from critical wells may not be considered as representative sampling events**. Remember, every data point counts.

9. Provide Current Land Owner Information

Responsible Parties (RP) are required to submit fee title holder information for the subject site to the RWQCB and to promptly update this information following any change in property ownership:

- √ Fee title holder name, mailing address, and phone number
- √ Copy of county record of current ownership (grant trust deed), available from the County Recorder's Office; or
- √ A completed "Certification Declaration for Compliance with Fee Title Holder Notification Requirements" (http://www.waterboards.ca.gov/losangeles/html/programs/ust/AB681_form.pdf)



California Regional Water Quality Control Board
Los Angeles Region

CERTIFICATION DECLARATION
FOR COMPLIANCE WITH
FEE TITLE HOLDER NOTIFICATION REQUIREMENTS
(California Water Code Section 13397.1)

Please Print or Type

Fee Title Holder(s): _____

Mailing Address: _____

Contact Person: _____

Telephone Number / Fax Number: _____

Site Name: _____

Address: _____

Contact Person: _____

Telephone Number / Fax Number: _____

File Number: _____

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." (See attached page for who shall sign the Certification Declaration).

Printed Name of Person Signing | Official Title

Signature | Date Signed

California Environmental Protection Agency

Also, if the contamination from your site has impacted another property, the same fee title holder information must be submitted for that property. Copies of future technical reports shall also be sent directly to the property owner of the site and to any other property owners impacted by contamination from your site. If this information has been provided in the past, you do not need to provide it again. **The RWQCB cannot issue site closure until this information is furnished.**

Example Groundwater Monitoring Report

1. Introduction
2. Site Background and History
3. Site Work Performed
4. Data Evaluation and Interpretation, QA/QC
5. Conceptual Site Model Update [*Sources, Pathways, and Receptors]*
6. Conclusions and Recommendations
7. Planned Future Work with Workplan

Figures

1. Site Map with Sample Locations
2. Concentration Contour Map
3. Groundwater Contour Map showing flow directions
4. Concentration vs. Time Graph

Tables (current and historic data)

1. Water Depth and Elevations
2. Water Sample Concentrations

Note: All reports must be signed by a professional geologist or professional civil engineer. Incomplete or insufficient reports may be referred to the State Licensing Board.

10. Request Closure and Provide Supporting Documentation

When all of the above items have been adequately addressed and it appears that the site will meet RWQCB closure criteria, the RP should submit a closure request package. You may obtain RWQCB closure criteria and related information on-line at the following location: http://www.waterboards.ca.gov/losangeles/html/programs/ust/new_approach.html

A closure request package should include the following:

- √ Summary table containing current soil, soil gas, and groundwater concentrations.
- √ Summary table containing all historical soil data, soil gas, and groundwater data for each well with groundwater depth (or elevation) and well screen intervals.
- √ Regional map depicting site vicinity.
- √ Site map showing site location, all historic (and current) UST systems (tanks, piping, dispensers, etc.) and adjacent facilities within 500'.
- √ Site map depicting all well locations, groundwater elevations (contour), and flow direction and gradient.
- √ Isoconcentration map for total petroleum hydrocarbons as gasoline (TPH-g), benzene, methyl tertiary butyl ether (MTBE), and tertiary butyl alcohol (TBA).
- √ Hydrograph superimposing concentration over time for TPH-g, benzene, MTBE, and TBA at the most impacted well (or any other wells as warranted).

FOR MORE INFORMATION

Visit the State Board and RWQCB on-line at:
http://www.waterboards.ca.gov

California Regional Water Quality Control Board—Los Angeles Region, 320 W. 4th Street, Suite 200, Los Angeles, California 90013
Phone (213) 576-6600 Fax (213) 576-6640 — Internet Address: http://www.waterboards.ca.gov/losangeles